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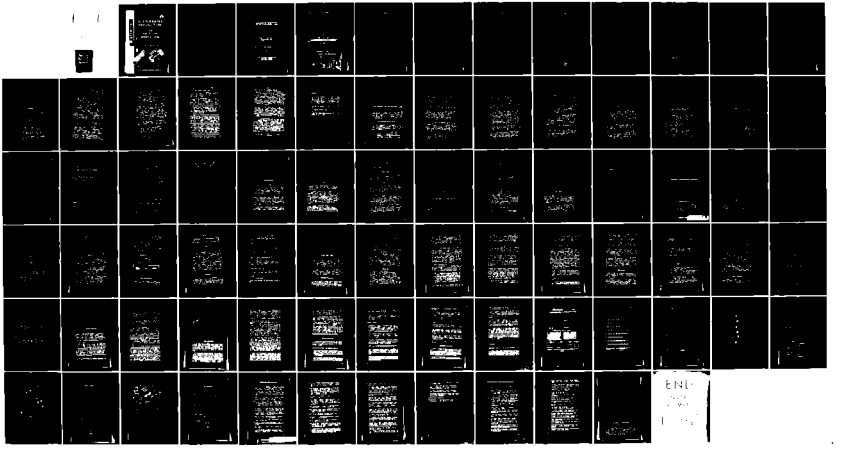

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ACCELERATED PRODUCTION:

THE AIR-TO-AIR MISSILE CASE

JOHN C. McLAURIN

the national defense university

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ACCELERATED PRODUCTION: THE AIR-TO-AIR MISSILE CASE

by

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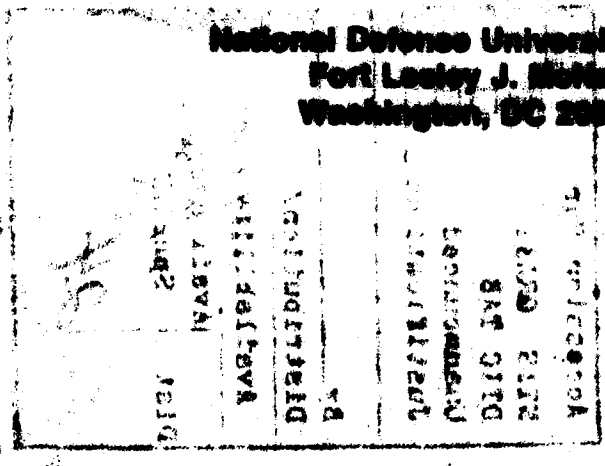

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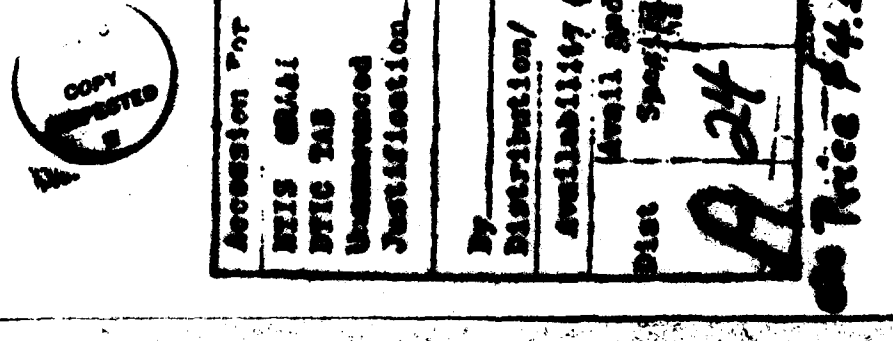


CONTENTS

FIGURES AND TABLES

Figures

Tables

FOREWORD

A key question in assessing our national security posture is whether US industry is capable of a timely response to our defense needs in the event of a major national emergency. The United States adopted the Industrial Preparedness Planning Program in 1969 to strengthen industrial capacity to meet mobilization needs. In this monograph Captain John C. McLaurin, USN, questions the success of that program.

By focusing on accelerated production of the air-to-air missile, the author illustrates two current surge and mobilization problems: shortages of war reserve materials and deficiencies in industrial base response times. The air-to-air missile is a high-technology, high-cost weapon that is critical to conventional warfighting. The problems associated with current stockpiles and accelerated production of this weapon are typical of those affecting similar items in the defense industry. This case study thus has implications for all high-technology weapons.

The author recommends first increasing the stockpile to a higher level and then investing in the industrial base to assure the capability to accelerate production during emergencies. He argues against investing in the stockpile alone and notes that industry will not voluntarily invest in industrial preparedness, but must be encouraged to participate in the Industrial Preparedness Program through coherent, sensitive government policies. Captain McLaurin suggests several cost-effective measures which might assist in the solution of these problems.

The management of resources in the interest of national security has long been a core part of the curriculum at our Industrial College of the Armed Forces (ICAF), National Defense University (NDU). NDU has recently created a Mobilization Concepts Development Center; this center and a broad spectrum of initiatives already undertaken by ICAF are intended to assist our defense establishment in focusing on the problems of industrial preparedness and mobilization. This monograph supports the thrust of that effort, raises questions, and suggests improvements in a long-neglected, but vital, area of our national security posture.

JOHN S. PUSTAY
Lieutenant General, USAF
President

ABOUT THE AUTHOR

Captain McLaurin wrote this monograph while assigned as a senior research fellow, Research Directorate, National Defense University. He has a background in naval patrol aviation, in which he commanded a squadron in 1975-1976. In Washington he has served on the staff of the Chief of Naval Operations and in the Organization of the Joint Chiefs of Staff. He received a degree in Engineering Science from the United States Naval Postgraduate School and a Master of Political Science from Auburn University. Captain McLaurin is now serving with the Chief of Naval Operations' Long Range Planning Group.

GLOSSARY

Cold Base—A planned producer's manufacturing facility which is not producing and/or is not scheduled to be producing the planned item on M/S-Day.

Industrial Preparedness Measure (IPM)—An action designed to shorten post M/S-Day lead time and/or to increase production and/or repair capacity for planned items and critical components.

Industrial Preparedness Planning List—The approved itemization of essential weapons and equipment for which surge and mobilization planning is required.

Industrial Preparedness Program (IPP)—Plans, actions, or measures for transforming the industrial base, either Government owned or civilian owned, from its peacetime activity to the emergency program necessary to support national defense objectives.

Lead Time—The period between the time an item is ordered for production by competent authority and the time the first item is delivered. It includes both administration (e.g., contract writing) and actual production. For this monograph, lead time does not include research and development.

Minimum Sustaining Rate (MSR)—The lowest production rate at which a plant can economically retain its production and/or maintenance capability for the item being reviewed.

Mobilization—The act of preparing for war or other emergencies by assembling and organizing national resources; the process by which the armed forces or part of them are brought to a state of readiness for war or other national emergency. This includes assembling and organizing personnel, supplies, and materiel for active military service.

Mobilization/Surge Day (M/S-Day)—The day on which mobilization and/or surge is to begin.

Planned Producer—An industrial firm that has indicated willingness to produce and/or maintain specified military items.

Prestocking—The storage of material and/or components before they are actually used in the production process. The storage facility and the stored material can be either contractor or Government owned.

Surge—To rapidly meet accelerated production requirements of selected items with existing facilities and equipment in a peacetime environment. (No declared national emergency.) Only existing peacetime program priorities will be available to obtain materials, components, and other industrial resources necessary to support accelerated program requirements.

Warm Base—A planned producer's manufacturing facility that is producing at a rate at least equal to its minimum sustaining rate.

EXECUTIVE SUMMARY

Currently, the US stockpile of air-to-air missiles falls short of requirements and the industrial base is not capable of closing the gap in a timely manner. Moreover, constraints on the defense budget are not likely to loosen. In view of these realities, schemes calling for total investment in a less-than-adequate stockpile speculate on single scenarios, thereby jeopardizing national security. We should invest in both a larger stockpile and increased industrial capability.

The Industrial Preparedness Program has failed to increase industrial capability for both peacetime and wartime production because it has not been well understood, supported, or executed. Key government personnel have given the program low priority, and industry, sensing that attitude, has lost faith in the program. Industry's lessened commitment, in turn, has precipitated further reduction in Government support.

To invigorate the program and, more importantly, industrial preparedness, Government needs to tie investments in surge and mobilization capability to peacetime production contracts. Ensuing from this approach are many advantages, such as realistically defined and clearly expressed requirements, reliable cost data, stimulated competition, reduced administrative lead time, and solid information on the capabilities of subcontractors and vendors.

To afford such contracts, Government should spread them over a period of about 5 years. These contracts should underwrite capital investment in prestocking critical items and installing more productive equipment. The savings experienced through multiyear contracts would help offset expenses incurred by acquiring greater surge capability.

The key, without adversely impacting on current peacetime production programs, is to enable the defense industry to effectively use the funds available during an emergency. Other recommendations are summarized toward the end of Chapter VI.

I

CONTEXT

This monograph is expressly designed for these audiences:

a. Senior staffs of Congress and the Office of the Secretary of Defense, because the text provides feedback on the programs and policies they developed.

b. Military program managers and operations and mobilization planners, because the chief initiative for improving the current situation is theirs.

c. Industrialists, because the major capability for improving the current defense posture is theirs.

d. All military leaders and managers, because the Industrial Preparedness Program (IPP) needs their understanding and support.

e. United States citizens interested in national security issues, because they help formulate and articulate policy.

If the reader has not had occasion to learn about things like weapons production, industrial preparedness, or the predicament in which the United States now finds itself, I think he will find the discussion interesting and useful. If he already knows about such

things, he may find the ideas and suggestions worthy of consideration. To those who do not care to know about such things, I make a special request to read on anyway. The United States has a problem and, although there is no consensus on how to solve it, thoughtful citizens should at least be aware of the consequences of their decisions.

The problem is that the United States holds in its inventories fewer weapons than defense planners believe are necessary to adequately defend against the Soviet threat, and the trends in the US–USSR balance are not favorable. The United States fell into this predicament partly through spending—by Central Intelligence Agency (CIA) estimate—only half as much for defense as the Soviet Union. This means that, even if the United States were to increase its defense spending by 10 percent a year, and the Soviets were to slow their annual rate of increase to 2 percent, at the end of 10 years Soviet expenditures would still be slightly higher than those of the United States.[1] Moreover, the problem is compounded by US indulgence in new technology. The weapons the United States buys are becoming far more complex—therefore more expensive and time consuming to produce. To be sure, qualitative improvements reduce quantitative requirements (providing the threat does not improve qualitatively). Nevertheless, calculations that include these improvements continue to show the requirements as greater than the stockpile. So the United States finds itself in a situation in which its stockpile is falling below requirements and it is increasingly more difficult to catch up.

The question is, then, what actions might ensure that the US armed services will have sufficient supplies of high-technology, high-cost weapons?

Many groups are working on the broad problem. For example, the Defense Industrial Base Panel of the House Armed Services Committee held hearings on this problem and reported out in January 1981. Appearing before the panel were concerned leaders, such as the Chairman of Lockheed Missiles and Space Company; the Chairman and Chief Executive, United Technologies Corporation; the Commander, Air Force Systems Command; and the Chief of Naval Material. The Defense Science Board reviewed the problem in 1976 and 1980. The General Accounting Office reported on it in 1976. The American Defense Preparedness Association held conferences on the subject in 1979 and 1980. The views of all, including

both criticisms and suggestions, are considered throughout this monograph.

Most of the discussion is applicable to the broad problem of defense capabilities, but I have focused the comments on one case study—that of the air-to-air missile. Air-to-air missiles are critical to conventional warfighting capability; their supply is less than optimum; they are high-technology, high-cost weapons; and the problems associated with their accelerated production are typical of those existing throughout the defense industry. Moreover, the unique methodology for calculating requirements for them merits special review. This manageable research case study can inform us about the larger problem and possible solutions.

In addition, I took into account the sometimes disparate and counterproductive views of project managers and operations and mobilization planners—at least my perception of their views. For some reason, mobilizers and operators seem to be moving in separate circles even though both groups seek the same goal: a strong defense. One reason may be that current military organization seems to institutionalize this concentricity. The military tends to assign mobilization matters to logisticians and allows operators to ignore the mobilization problem. Another reason may be that the decision to have both guns and butter during the Vietnam War gave the impression we could fight a war without mobilizing. But the Vietnam effort may have given the United States an undeserved confidence. The Soviet Union is a much bigger threat and mobilization would have to come into play in this worst case.

To fully appreciate views about the shortfall problem, one needs to keep in mind the evolving concept of "surge" and how it relates to mobilization. "Mobilization" is defined by the Department of Defense (DOD) as:

> The act of preparing for war or other emergencies through assembling and organizing national resources; the process by which the armed forces or part of them are brought to a state or readiness for war or other national emergency. This includes assembling and organizing personnel, supplies, and material for active military service.[2]

"Surge," on the other hand, is

> . . . to rapidly meet accelerated production requirements of selected items with existing facilities and equipment in a peace-

time environment. (No declared national emergency.) Only existing peacetime program priorities will be available to obtain materials, components, and other industrial resources necessary to support accelerated program requirements.[3]

Note that "surge" seems to be a transition between peacetime and wartime. It can be applied to a single weapon system rather than across the board. It is designed not to interfere with civilian or other defense demands on industry.

The shortfall problem engendered a powerful argument that any expenditures to improve the industrial base would adversely affect the stockpile. But, data is inadequate to support such a conclusion. It is not enough to refer to current production rates and costs. It is not enough to speak only to prime contractors. It is not enough to consider industry's capabilities under current contracting procedures.

When data does not exist, the alternatives are to rely on logic and to develop the data. This monograph does both: it uses logic to show why we should invest in the industrial base and shows a way to acquire data on which to base sound investment decisions. At a minimum, it suggests some actions we can take that cost nothing but will enhance industrial preparedness. Those suggestions alone are worthy of the reader's consideration.

In Chapter II, the relationship between current stockpile and industrial base conditions is discussed as a way of showing the need for paying greater attention to industrial preparedness. Chapter III describes the first step in improving preparedness—defining requirements. In the air-to-air missile case, a unique way is used to develop requirements and this method has led to a detrimental effect on the overall process for improving industrial preparedness. Chapter IV briefly explains the overall process, called the Industrial Preparedness Program, noting successes and shortcomings. While discussion throughout will be solution oriented, Chapter V will deal expressly with recommendations for increasing industrial productivity. Finally, Chapter VI summarizes the discussion and recommendations which support this thesis: (a) the United States needs to motivate industry to better prepare itself for surge and mobilization, (b) contracts are the best way to attract industry, and (c) Government and industry can design contracts that provide increased capability without unduly impacting peacetime production.

This paper does not cover several related topics that one might consider for future research. For example, in the course of my re-

search I did not get the feeling that either Government or industry was prepared to handle the manpower issues that may arise during a national emergency. The simultaneous demands for manpower that will be made by reserve call-ups, draft, and accelerated industrial production will be acute. One possible way to relieve existing constraints on industrial capacity is to hire more people. As an example, one contractor, in preparing for accelerated production during the Berlin crisis, increased the plant's work force by 59 percent and rearranged process plans so that the work span for each employee was only 6 minutes—thus, to a great extent, alleviating the training problem.[4] Even on a job being accomplished in peacetime by computer-controlled machinery, a large number of people could be used to parallel the automated portion of the line. Perhaps we should be coordinating more of our mobilization planning with labor unions as well as industrial management.

The second area in which further study may be called for is the foreign influence on US industrial preparedness. Prearranging with Foreign Military Sales customers to divert missiles in production to US needs may be one way to relieve US shortfalls during an emergency. Coproduction of missiles with allies is another potential source of mobilization and surge production. Finally, whereas during mobilization it would not be prudent for US contractors to rely on foreign supplies of material and components, it may be desirable during surge conditions.

Third, this monograph analyzes only those missiles in production at this writing: AIM-7F(M) SPARROW, AIM-9L(M) SIDEWINDER, and AIM-54A(C) PHOENIX. For a brief description of them, see Appendices B through D. There are mobilization requirements for all three. The AMRAAM, a new system with which the Air Force is working, is not far enough along to be included in industrial planning. However, I would strongly recommend that the suggestions made in this monograph be considered in the development and procurement of AMRAAM. The AIM-4 FALCON is no longer in production, nor are there plans to produce it during a national emergency. A study might find that it would be cost effective to preserve the capability to produce this older missile.

This study begins with a review of the current conditions of the stockpile of weapons and the industrial base.

I. ENDNOTES

1. Fred Charles Ikle, "Preparing for Industrial Mobilization: The First Step Toward Full Strength," *National Security in the 1980s: From Weakness to Strength*, ed. W. Scott Thompson et al. (San Francisco, CA: Institute for Contemporary Studies, 1980), pp. 57–58. The twice-US-spending estimate was for 1976 estimated dollar costs. For 1979 and 1980 the USSR spent 75 percent more than the United States. See Central Intelligence Agency, *Soviet and US Defense Activities, 1971–80; A Dollar Cost Comparison*, Washington, DC, January 1981.

2. US, Department of Defense, *Industrial Preparedness Planning Manual, DOD 4005.3–M* (Washington, DC: Government Printing Office, July 1972), p. 57.

3. US, Department of Defense, *Industrial Preparedness Planning Manual*, draft revision of 1972 version, 1981, p. ix.

4. Sidney Stark, "Sparrow Surge Planning," presented at the 1979 Annual Meeting of the Industrial Preparedness Division, American Defense Preparedness Association, Alexandria, VA, 24 April 1979.

II

THE STOCKPILE AND THE INDUSTRIAL BASE

Air superiority has an essential role in US warfighting strategy, whether for land or sea battles, for full-scale North Atlantic Treaty Organization (NATO) conventional war, or for Persian Gulf contingency. Without superiority in the air, bombers and attack aircraft cannot take the battle to the enemy, transports cannot reinforce troops, helicopters are not mobile. Air superiority deserves and usually receives high priority.

THE CONDITION OF THE STOCKPILE

This priority notwithstanding, the US stockpile of the fighter aircraft's primary armament, air-to-air missiles, falls far short of requirements. A US Air Force wing commander in Germany said, "We have just a 7-day supply of [air-to-air] missiles. I don't know what would happen in an extended war."[1]

In broader terms, the Chief of Naval Material stated:

> Suffice to say we are consistently below our defined inventory requirements in all of these [below-mentioned] categories. As a rough estimate across the board we have less than half the required inventory. Our total deficiency is approximately

> $12 billion with respect to the full mobilization requirement, approximately $10 billion in ordnance and $2 billion for spare parts, base support, and equipment.[2]

And, in all likelihood, that inventory will continue to fall short. Other demands on the budget, high costs for high technology, the historical difficulty of obtaining defense dollars during peacetime, and the understandable anxiety over inflation are strong pressures that so far have kept down defense spending. Even the Navy and the Air Force, both aware of the importance of air-to-air missiles, find that competing requirements do not permit them to procure as many missiles as they would like. *Reality #1 is that the stockpile of air-to-air missiles is short of objectives at the time of this writing and is likely to remain short for at least the next 5 years.*

This reality should be kept in mind as we examine the arguments of some who advocate building the stockpile only—without improving the industrial base. First, there are those who subscribe to a "first things first" philosophy; that is, produce the items needed for the first few weeks of a war and then worry about having an industrial base that can deliver additional items. While acknowledging the threat of a prolonged war, they argue that it makes little sense to worry about the capability to produce items 17 months after the war begins when one lacks the items needed for the first 6 months. In constrained peacetime budgets, however, this approach has been a "first things *only*" philosophy. In fact, the United States does not have even the "first things" in the storage bins.

A second group clings to the likelihood that the next war will be a short one preceded by a short warning. They argue that the specter of escalating to nuclear warfare will be an irresistible pressure to reach an early resolution of conflict. An example of what this group anticipates is the 1973 Arab-Israeli War. The advocates of the short-war scenario disavow the utility of industrial preparedness. This line of reasoning is critiqued by Dr. Fred Ikle, former Director of the Arms Control and Disarmament Agency and now Under Secretary of Defense for Policy:

> One is reminded of a bridge builder whose bridge fails to span the river. When asked whether he does not need additional timbers to complete the job, he answers that none are needed since he is planning for a "short bridge."[3]

Again, in reality, there are not enough missiles to fight even a short war.

If one were to agree either that we should plan on a short warning followed by a short war, or that we should do first things first, one should also agree it would not be prudent to put all our effort into one scenario. In either scenario there is a substantial risk of being wrong about the length of the war or about what and how much will be needed. Richard Danzig, former Principal Deputy Assistant Secretary of Defense (Manpower, Reserve Affairs, and Logistics), relates this philosophy to the man who buys life insurance because he believes death is the worst thing that could happen to his family. The man would be foolish if that were all he bought; if every time someone approached him with a fire insurance policy, he said, "Oh, no, I only invest in the worst case. What I'm going to do is buy myself a million dollars of life insurance and if I've got any extra money, I'm going to buy some more life insurance, but I'll never invest a penny in fire insurance."[4]

Danzig's idea that one should diversify his portfolio applies to more than just the debate on which scenario to plan. It can also apply to the various approaches to war preparation that assume no particular scenario. For example, this monograph on air-to-air missile production accepts the primacy of increasing the stockpile. However, even though the stockpile is first priority, it should not eliminate other action—namely, investing in industrial preparedness. Using Danzig's words again, "What you ought to do, in my view, is invest in the first one until the marginal return on that investment turns out to be lower than beginning the investment on a second one." This argument has even greater weight when competing priorities have constrained the stockpile to a peacetime level less than that needed in war.

In considering US strengths and USSR weaknesses in strategy development, does the United States have to let the Soviets decide the length of a war? Are there not ways to stretch out a war? "He who prepares only for a short war is likely to get one."[5]

Up to now wartime scenarios have dominated the discussion. There are plausible peacetime situations in which a President, as a deterrent measure, or a Congress, reacting to a Soviet move (for example, in Cuba), would call for increasing the defense budget by 40 to 50 percent.[6] Or maybe they would single out a sector of the defense industry, like air-to-air missiles, and order rapid expansion.

Such moves would be much less inflammatory than deploying a fighter squadron or mobilizing troops. They would send a strong deterrent signal and concomitantly give industry a head start toward meeting any threat.

The election results in November 1980 showed how dramatically opinion can swing in the direction of a large increase in defense spending. Another example occurred in 1950, after an in-depth study (called NSC 68) headed by Paul Nitze pointed out the magnitude of the Soviet threat and the US inadequacy to meet it. Clarified by NSC 68, the national mood was moving in the direction of a substantial budget increase when the Korean War precipitated the decision.

If such a decision were made today, the results would not be very tangible for many months, because the industrial base is not ready. How can we prepare ourselves for such an event? Danzig suggested we start at the end of the problem and ask ourselves what we would buy if we had an increase of 50 percent in the budget. How would we tie everything together? From that end product we then move back in time and ask ourselves what investments we should make now to have the capability to do everything we said we wanted to do when the dollars came. This approach will predominate the discussion in this monograph: to prepare for accelerated production.

Regardless of how one feels about the arguments presented thus far, there should be room for agreement on the next one. Some may be willing to risk not having in the stockpile until 1987 all the missiles we require for a NATO war. But, they should not also wish to draw down the current stockpile. A strong industrial base is needed to rapidly replace items earmarked for NATO if they are withdrawn from the stockpile and used in a contingency elsewhere. There are plausible peacetime and wartime scenarios for this happening; for example, to replace the hardware given to Israel (as the United States did in 1973) or expended in Rapid Deployment Force action in the Persian Gulf.

At a minimum, we would want to be very careful not to reduce our industrial capability through concern for near-term production costs. An example of reducing capability involves a recent contract for a key component of an air-to-air missile that was allowed to expire. Two producers had been operating in parallel but one picked up the entire contract; that is, he became the sole source for that component. The Government saved $1.7 million dollars. But, in effect

what it did was trade the capability to produce 350 missiles a month for the price of 16.5 missiles.[7] Moreover, sabotage or a union strike against the remaining plant could result in no missiles being produced for at least 8 months until an alternate source begins delivering. The marginal return on an investment of $1.7 million in this case is clearly greater for dual rather than single source.

To summarize the stockpile situation, then, the driving factor is Reality #1—the stockpile is short and is likely to continue to be short. The United States needs to invest in both the stockpile and the industrial base to reduce the risk involved in solely investing in the short-war scenario and first things first, to prepare for possible budget increases, and to avoid drawing down the existing stockpile.

THE CONDITION OF THE BASE

If the programming decisions have been made and the stockpile continues to fall short of requirements, the logical next step to decrease risk to warfighting strategy is to ensure an industrial base capable of adding to the stockpile at an accelerated rate sufficient to meet the requirements of the strategy. This step does not suggest we stop production. Far from it. This approach advocates producing as many missiles as defense budget priorities will allow. Upon approaching the budget ceiling, if the level of production is still below that needed, we should go one step further and make sure the industrial base is capable of producing the needed quantities in reasonable time once the "go" signal is given.

The implication is that, when the "go" signal is given, conditions will be such that funding will be made available for production at maximum capacity. This accelerated production pace will call for added expenses, such as multiple work shifts, overtime, expedited transportation, continuous vice batch processing, and opening up new lines. But, in an emergency, efficiency is not the key factor. The emphasis shifts from cost to time. The key is to put ourselves in a position to take maximum advantage of these increased funds without sacrificing peacetime production, to make wartime industrial capability and peacetime production enhance each other. For example, a manufacturer can accelerate his production much faster from a base where some production is in progress (warm base) than from a base where production has stopped (cold base). For air-to-air missiles, it appears to make a difference of 6 to 12 months.

However, without the proper amount of attention the industrial base will not respond to our needs. Experience provides one argument. At the outset of the Korean War, accelerated production was initiated but, because the industrial base had been inactive, not much of the material made it to the battlefield. "None of the thousands of tanks which were produced by Ford, General Motors, and Chrysler, the planned producers, for example, was deployed."[8]

One might point with pride to US industry's accomplishments in World War II and say, "They said it couldn't be done then, but we did it." However, he should recall that the United States had a 2-year head start through Britain's arms purchases, lend-lease, and "anticipatory measures by the Roosevelt administration."[9] The United States may not have 2 years' warning next time, and certainly should not depend on it.

when all of Corning's defense business amounts to less than 0.5 percent of its sales?[12]

Concerned observers agree that there is a trend away from defense business, especially at the subcontractor level.[13] One contractor pointed out that in 1979 more money was made on television computer games than on electronic warfare equipment. Contractors cite the following as detractors for defense business: high risks and low profit margins, changing and unclear DOD requirements, cumbersome and expensive regulations and paperwork, and small orders. Another disillusionment: prior to the Vietnam War, the Department of Defense had identified certain corporations as "planned producers"—those firms indicating a willingness to produce items during a national emergency. When the war came, Government contracts in many cases went to low bidders who were not planned producers thus wasting any investment a firm might have made as a result of agreeing to be a part of the preparedness program. Even though a national emergency was not formally declared, Government needs to be more sensitive to the interests of its mobilization partners and to the credibility of the program.

Yet another disincentive is the way the Government usually does business—annual contracts. The budget must be approved, the contract let, and the prime contractors in turn negotiate with their subcontractors. The second step alone, Government-to-prime contract, averages 3 months. Meanwhile, production decisions wait. Understandably, some companies do not commit funds to protect lead times by prestocking until they have a contract. Moreover, in the 1970s at least one state discouraged prestocking by taxing inventories.[14]

So, through physical plant limitations, competitive demands on industry, and Government policies and procedures, many factors operate to reduce the responsiveness of the industrial base to defense needs and the trends are adverse. *This is Reality #2: unless Government acts, the industrial base in the 1980s will not be able to meet the desired level of production during an emergency.*

THE UTILITY OF INDUSTRIAL PREPAREDNESS

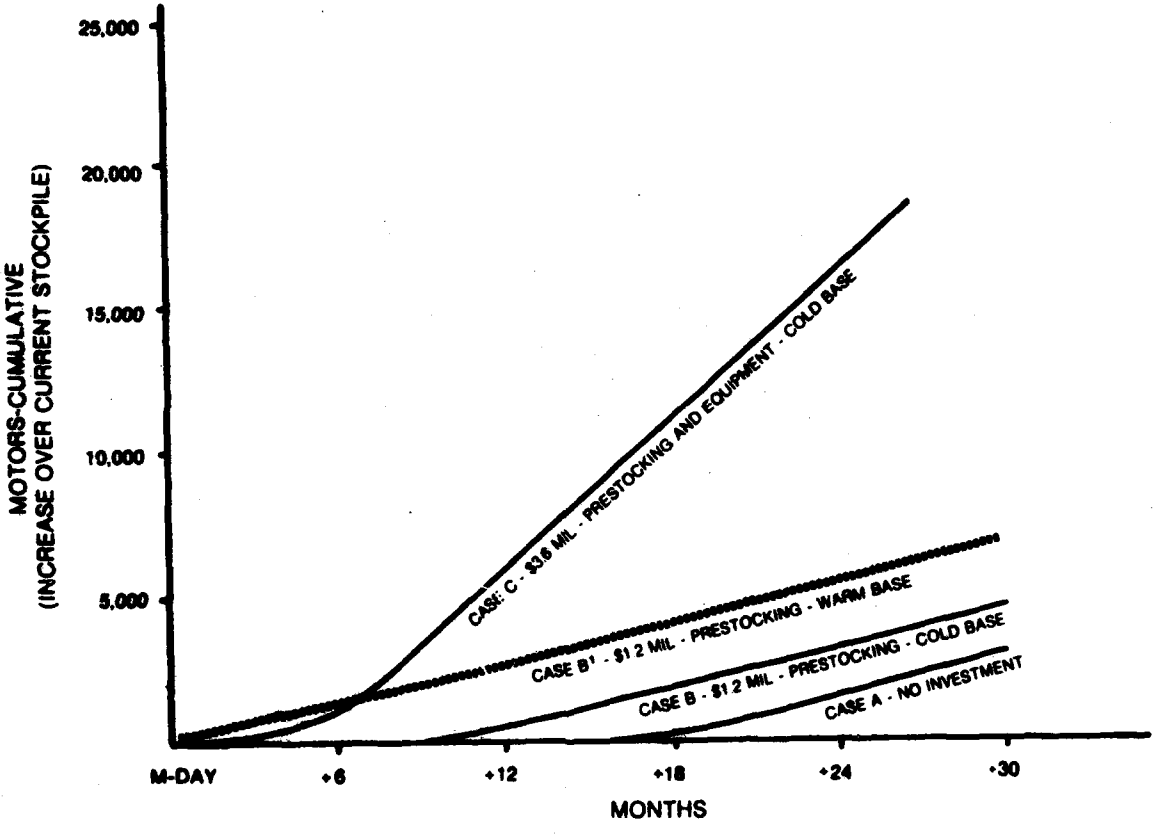
The industrial base has great potential. Consider a particular investment; for example, the cost associated with an accelerated production capability for a key subassembly on an air-to-air missile.[15] The example shown in Figure II–1 is derived from current IPP planning schedules and a study funded by the Navy and conducted by Hercules Incorporated dealing with its manufacture of rocket motors for the AIM-9 SIDEWINDER.[16] The study was completed in August 1980, and already some of the company's capabilities have changed. But the study serves well to illustrate the cost-benefit aspect of investment in industrial preparedness.

Case A shows the company's capability to produce with the "go" signal given at Mobilization Day (M-Day), from a cold start, and with existing facilities. It is important to understand that no amount of money provided after M-Day will change this picture until, perhaps, M-Day plus 30 months (M+30) to M+36 when the addition of special tooling and equipment could begin to take effect.

In Case B, the conditions are the same except Government spends $1.2 million on prestocking certain long lead-time material and components. Unlike facilities, there is a reasonable certainty that prestocked materials and components will eventually be used. They are being bought ahead of time because they take so long to procure or assemble and, as the stockpile climbs closer to the required level in peacetime, the manufacturer begins using the prestocked materials. Note that prestocking does not increase a plant's capacity. The slopes of the production rate lines for Cases A and B are the same. Prestocking does allow the plant to reach capacity sooner. In the example, it allows Hercules to reach its producing capacity of 230 per month about 7 to 8 months sooner.

To increase capacity, additional equipment is needed. In Case C, Government makes a peacetime investment of $2 million in prestocking materials and components and $1.5 million in special tooling and equipment.

Above, we discussed the advantage of accelerating from a warm base compared to a cold one. Case B[1] conditions are the same as in Case B except that the plant is assumed to be operating at a rate of 40 units a month when M-Day is signaled.



AIM - 9 ROCKET MOTOR DELIVERIES - VARIOUS BASE CONDITIONS

FIGURE II - 1

The cost figures mentioned above are peacetime costs. They are the ones that sting the most, that have to compete with other priorities. Specific recommendations as to how to accomplish such investments are included in Chapter V. But for now, I would like to make the case that it is worth our while to carefully investigate industrial preparedness possibilities.

A CASE FOR INDUSTRIAL PREPAREDNESS

We should continue to build our stockpile. However, as long as stocks fall short of requirements, we will need to look for capability to bridge the gap. Moreover, the Services should prepare for a large increase in the defense budget. At a minimum, the United States needs to have a capability to rapidly replace items withdrawn during contingencies. The marginal utility of investments in the stockpile should be continuously weighed, as a matter of policy, with that of investments in the industrial base. This does not imply, however, an "either-or" dilemma; we can, and should, do both.

Today's capability is worrisome. Even though one can safely assume that more money will be available during an emergency, that money will not produce early results through today's industrial base. Lead times have lengthened over the years. Industry is leaning away from defense business and is not willing to invest in greater productivity. Government policies and actions are partly to blame.

Peacetime investments can result in big payoffs, however. Figure II–1 illustrates how one might go about selecting specific areas of investment. A major factor in the selection is the requirement, which deserves special review.

II. ENDNOTES

1. Colonel H.N. Campbell, USAF, Commander 36th Tactical Fighter Wing. As quoted by Howard Silber, "Air Force in Europe: 'The Best' Tries to Make Do," *Omaha World-Herald*, 7 October 1980, p. 6.

2. Admiral A.J. Whittle, USN, Chief of Naval Material, Statement to the Panel on Defense Industrial Base, US, Congress, House, Committee on

Armed Services, *Capability of US Defense Industrial Base, Hearings before the Committee on Armed Services and the Panel on Defense Industrial Base*, 96th Cong., 2d sess., 1980, p. 683.

3. Fred Charles Ikle, "Preparing for Industrial Mobilization: The First Step Toward Full Strength," *National Security in the 1980's: From Weakness to Strength*, ed. W. Scott Thompson et al. (San Francisco: Institute for Contemporary Studies, 1980), p. 63.

4. Richard Danzig, as quoted in American Defense Preparedness Association, *Proceedings of the Defense Readiness and Requirements Symposium, Andrews AFB, 24–25 September 1980* (Arlington, VA: American Defense Preparedness Association, 1980), pp. 30–44.

5. Lieutenant General Don Keith, USA, as quoted by Defense Science Board Task Force on Industrial Preparedness, 6 August 1980.

6. Danzig, pp. 38–39.

7. The example used was the decision not to renew a SIDEWINDER rocket motor contract with Hercules Incorporated in October 1980.

8. Henry A. Miley, Jr., "Future Industrial Mobilization," *National Defense* 63 (July–August 1978): 55.

9. Ikle, "Preparing for Industrial Mobilization," p. 61.

10. Hans M. Mark, "Productivity, Technology, and the Illusion of the Free Lunch," *Defense 80*, August 1980, p. 8.

11. General Alton D. Slay, USAF, "The Air Force Systems Command Statement on Defense Industrial Base Issues," presented to the Defense Industrial Base Panel of the House Armed Services Committee, 96th Cong., 2d sess., 13 November 1980.

12. Lieutenant Colonel Howard E. Bethel, USAF, et al., "Industrial Preparedness Planning—An Evaluation and Proposal" (Final Report of Defense Management Issue Analysis #11—Vertical Slice Real-Time Planning to the Industrial College of the Armed Forces, 11 June 1979), p. G–24.

13. See American Defense Preparedness Association, *Proceedings of the Defense Readiness and Requirements Symposium, Andrews AFB, 24–25 September 1980* (Arlington, VA: American Defense Preparedness Association, 1980).

14. Bethel, "Industrial Preparedness Planning," p. G–28.

15. To keep the study unclassified and to honor the proprietary interests of the respective contractors, examples in this study will not be specific enough to identify the missile, component, or the manufacturer, unless specific approval has been granted by the contractor.

16. Hercules Incorporated, "Analysis of Mobilization and Surge Production Capabilities for MK 36 MOD 8, MK 39 MOD 7, and MK 47 MOD 0 Rocket Motors at Naval Weapons Industrial Reserve Plant, McGregor, TX, Operated by Hercules Incorporated." (Prepared for Department of the Navy in Response to Contract N00019-79-C-0547, August 1980).

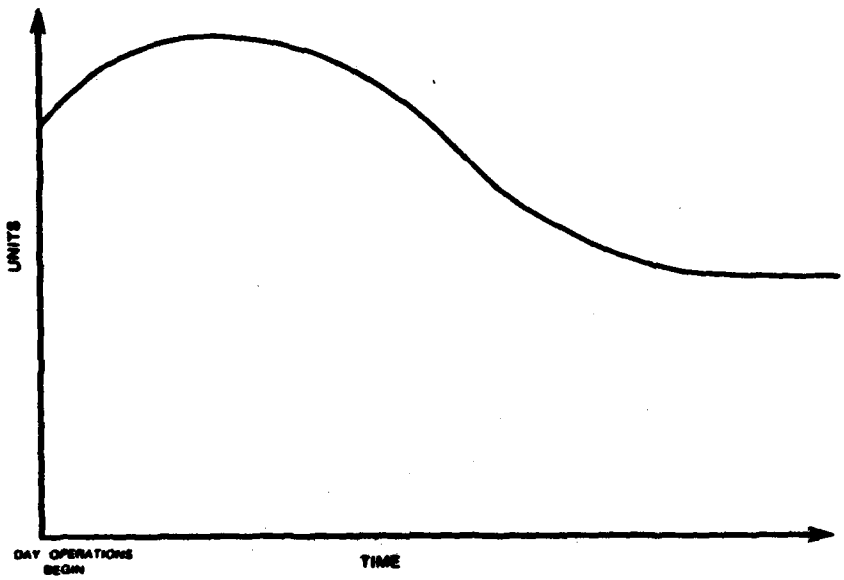
III

REQUIREMENTS

According to current DOD practice, there are two ways of computing requirements. The first is called "level of effort," and is the *method with which most of us are familiar. Demands are expressed* as a function of time, much like the graph at Figure III–1. Computations are based on estimated rates of consumption, intensity of operations for both offensive and defensive tactics, length of conflict, and so forth. Level of effort requirements are often expressed as the number of units needed the first 30 days, the first 60 days, 90 days, and 180 days of conflict.

Air-to-air missiles belong to a second category called "mission-oriented" or "threat-oriented" weapons. The methodology for determining this type requirement considers such things as the number of threat aircraft, probability of kill for that missile, action by other types of weapons like surface-to-air missiles and guns, and splitting the workload among the different Services. It is expressed as a total number of weapons, and the operator believes he should have this quantity available for use on the first day of the conflict.

The latter method is probably the best possible way of determining requirements for air-to-air missiles. The DOD Sustainability Study conducted in October 1979 opined that this methodology was preferred and the resulting numbers, if anything, were low.[1] The



HYPOTHETICAL DEMAND CURVE

FIGURE III - 1

threat-oriented method is logically appealing and is independent of assumptions one would have to make if trying to base requirements on some sort of scenario. Until a better method is discovered, this one will have to do.

But the problem does not end with a determination of the number of missiles needed. We also need to build the missiles. One should keep in mind two realities: Reality #1 is that we are short of missiles, and Reality #2 is that industry cannot produce them all in one day or week or month. Notwithstanding these realities, a gap exists in communications. The operations planner states that he needs N missiles in place on the first day hostilities commence, then turns his back to the rest of the world while expecting the stockpile to grow. The mobilization planner says, "it can't be done, here is what can be done"—which turns out to be not enough. But his message isn't heard.

As an example of this dichotomy, consider this case from Fiscal Year 1981 mobilization planning data. It involves the pacing item for one of the missiles under review. The requirement the Department of Defense passed to a manufacturer for this component was for 3,240 units. The manufacturer responded with the schedule shown in Table III–1.

MONTHLY SCHEDULE											
M+1 2 3	4 5 6	7 8 9	10 11 12	13 14 15	16 17 18	19 20 21	22 23 24	25 26 27	28 29 30	31 32 33	34 35 36
DELIVERY SHOULD M-DAY OCCUR DURING FY 81											
100 100 100	100 100 82	80 51 66	80 64 80	81 100 101	101 101 101	101 101 101	101 101 101	101 101 101	101 101 101	101 101 101	101 101 101

Delivery Schedule

TABLE III - 1

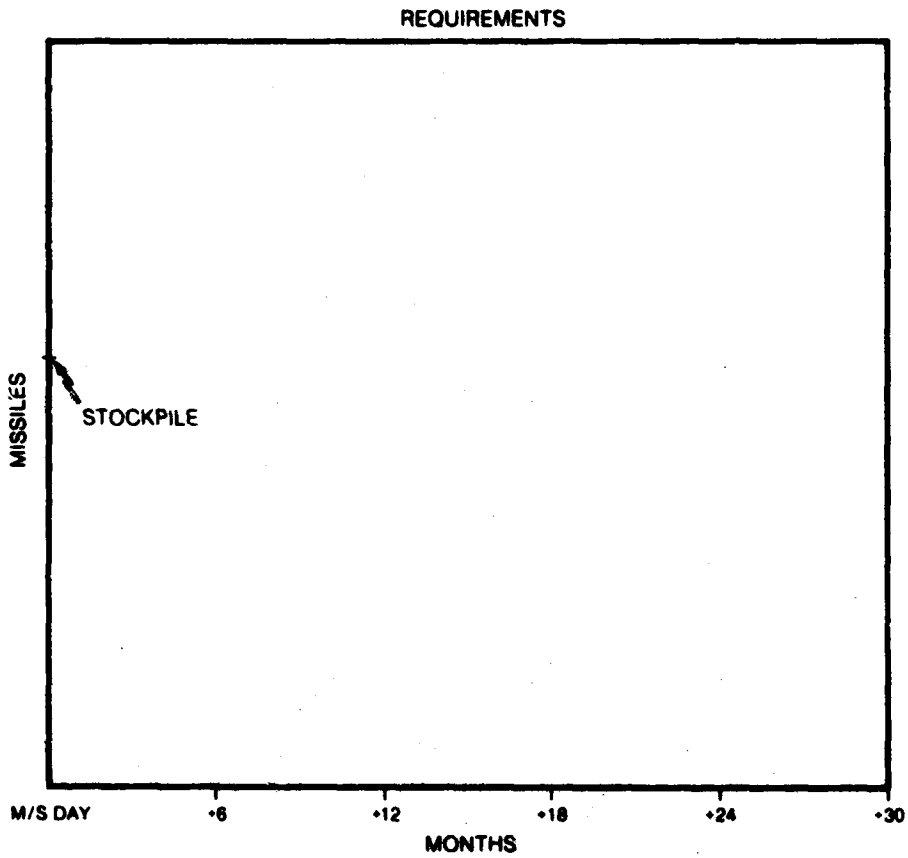
Fulfilling the requirement in 36 months poses an unacceptable risk to US air superiority in most scenarios, but this is where the dialogue ended. The operations planner's stockpile did not get much larger. The manufacturer was not asked to improve his capability. The mobilization planner wondered why he went through the drill.

A BETTER WAY

We need teamwork. Government needs to express its requirements more clearly and realistically to industry in order for them to respond to production needs. If a manufacturer has been producing under a contract at a rate of 100 units per month, it is unrealistic to then ask him for 3,000 in a month. Bear in mind, this section is not quarreling with the way requirements are derived, but with the way they are passed on to industry.

There is a better way. Up to this point the steps are obvious: (a) determine the number of missiles required to do the job, and (b) subtract the number in the stockpile from the number required. Call this the mobilization requirement. Next, we need to determine the most reasonable production rate to fulfill the mobilization requirement. Ideally, all the required missiles would be in the stockpile on the day operations commence, but in reality there must be a compromise. The authors of the Sustainability Study, while endorsing the threat-oriented methodology, stated, "There is nonetheless a time-dependent aspect to the expenditure of those types of ordnance."[2]

One might visualize the task as shown in Figure III-2. We need to draw a line from the "stockpile" point at M/S-Day to a point somewhere on the requirements line. The factors bearing on the choice of the end point are wartime risks and peacetime costs. The further to the right the point is, the higher the risks; the more to the left, the higher the costs.



MISSILE DELIVERIES

FIGURE III - 2

The risk factors involve questions such as the following:

—How much warning will there be?

—Are the missiles maldistributed on the day fighting begins (that is, can they be moved from Point A to Point B to help fill the gap)?

—How long can we stall?

—How many sorties will be flown the first few weeks?

—How many enemy aircraft will we engage the first few weeks?

—How many enemy aircraft will it take to deny us air superiority?

—What are the consequences of losing the air war?[3]

Without wandering into assumptions and scenarios, these questions seem too tough to answer. But we should be able to draw a box around the desired production rate. Forgetting risks and costs for the moment, let us point out where along the requirements line is the maximum amount of time we should consider. It should be at about the M+30 point. It is safe to say that within 30 months industry can acquire the materials and equipment it needs and deliver enough missiles to meet requirements. No peacetime expenditures are required to get well into 30 months.

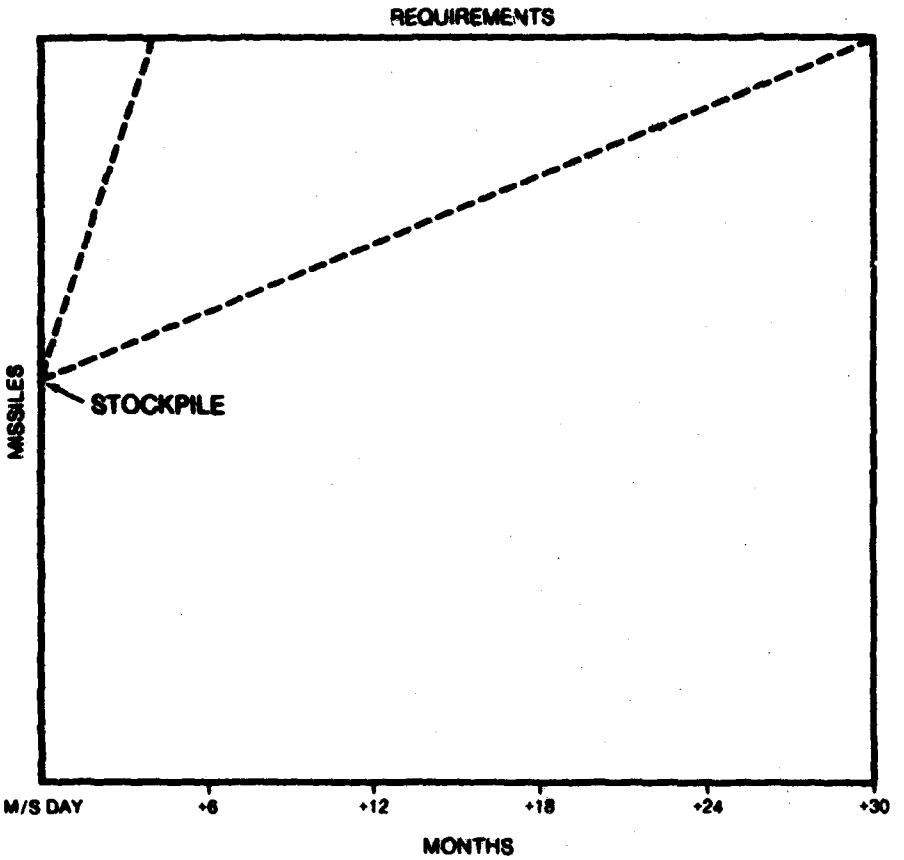
The furthest to the left we should go is about M+4. Remember, M-Day is out. Reality #1 is that we are short. Depending on where along the current programmed-buy curve M-Day occurs, the minimum response time is about M+4 months—no matter how many peacetime dollars are spent. By "current programmed buy," I am referring to the 5-year defense plan. Even though in the 20-plus-year history of air-to-air missiles, the Department of Defense has never reached stockpile objectives, it usually plans to by the end of 5 years.

In Figure III–3 the dotted lines show these two extreme production rates. Bear in mind that M/S-Day does not necessarily occur on the same day that operations begin. For a mobilization situation, there is likely to be some warning time. For surge situations, there will be time to build the stockpile before using it.

With the preliminaries set down, Chapter IV will describe a way to find a line somewhere between the dotted lines that will have a slope representing a production rate to which we want the industrial base to agree. Throughout the process one should keep in mind that any peacetime investments in the base are second priority to building the stockpile. The Department of Defense should use funds that result in a marginal utility greater than that expected with funds invested in the stockpile. Moreover, under our term "peacetime costs," we include time. Time is needed to procure and install equipment and material intended to cut production time for each end item and to increase the volume of items that can be produced. Some equipment would take 2 years to design, build, and install.

THE FIRST STEP

Determining the number of air-to-air missiles needed through a model that includes the number of threat aircraft, probability of kill,



MISSILE DELIVERIES

FIGURE III - 3

etc., is the best method. That number, minus the quantity in the stockpile, is the production goal for industry. But simply relaying that number to industry has not ensured that during an emergency they will be able to deliver the missiles in a timely fashion, no matter how many resources are fed into the process after M-day. Operations and mobilization planners and industry need to work together to develop this capability.

The team's first milestone should be to establish a realistic production rate which will achieve desired missile quantities in a satisfactory timeframe, a rate that falls within the dotted lines of Figure III–3. To choose the rate, decisionmakers will have to weigh reduction in risk with the peacetime cost. One way to do this is to compare the utility for several options. Each of the options will, of course,

have a price tag. A mechanism in being through which one can acquire the data for these options is the Industrial Preparedness Program.

III. ENDNOTES

1. US, Office of the Secretary of Defense, "Department of Defense Sustainability Study," October 1979, vol. 2, SECRET, p. IV–105.

2. Ibid., p. IV–94.

3. The answer to this question must be compared to answers to the same question for other weapon systems when deciding where peacetime dollars go.

IV

THE INDUSTRIAL PREPAREDNESS PROGRAM

For the past several years mobilization planning for certain critical military items has been conducted under the auspices of a much criticized policy—the Industrial Preparedness Program (IPP). There are many like people expending many manhours and dollars under this program. Since the comptroller industrial base points out that the results of its efforts are not as good as we would like, we should change either the program itself or the way we are executing it.

In addressing this point, this chapter first provides a macroscopic view of the parts of IPP that specifically relate to the air-to-air missile case. Then it explores some of the criticisms that have been made about the IPP and makes suggestions for better ways to handle requirements.

The Air-to-Air Missile

The Navy and the Air Force monitored air-to-air missiles for the Industrial Preparedness Planning List, a list of selected weapons and equipment for which special maintenance planning is desired. Contractor plants should be thoroughly prepared so that the IPP will not be overlooked. Under IPP guidance, the Directorate of the Navy and Air Force also allocated [illegible] of the [illegible]

The two departments then compute their requirements for the missiles—this step was discussed in Chapter III.

The Navy is the executive service for the three air-to-air missiles spotlighted in this monograph even though the Air Force is a major user of SPARROW and SIDEWINDER. The Navy is therefore responsible for the third step: selecting contractors to be "planned producers." A "planned producer" is an industrial firm that has indicated a willingness to produce the specified military item under IPP procedures.[1] This important step should be understood and appreciated by all who are involved in weapons procurement. The producer's qualifications should be examined carefully, including those of his subcontractors and vendors. No material or components for mobilization planning should come from non-US manufacturers (with the exception of Canada). His subcontractors should be able to accelerate production at least as well as the prime contractor. To be a planned producer he does not necessarily have to be currently producing the item, but it certainly would be an advantage as we showed in Figure III–1, Case B[1]. He should have proven his capabilities where possible.

A planned producer who takes the job seriously can be of great assistance in developing a responsive industrial base. Not only can he provide to the Department of Defense data on which to make informed decisions, but can take measures on his own to improve his productivity and capacity. This will only happen if he has confidence in the system and his role in it, and if he is given clear, realistic requirements.

Not all manufacturers are willing to participate. Time and effort are required to do the job properly. Unfortunately, the Government has not always been helpful. In Fiscal Years 1980 and 1981, the Government did finance some in-depth studies of planned producer capabilities. However, nearsighted decisions, like granting production contracts to manufacturers other than planned producers, negate any incentive they might have and undermine the entire program. As mentioned earlier, the United States did that during the Vietnam War. As recently as Fiscal Year 1980, the Government did the same for a component of the SIDEWINDER missile. This is not to assert capriciousness on the part of Government decisionmakers. There were probably good reasons for the decisions. However, it is not clear that the consequences of these decisions were fully appre-

ciated. Industrial base capabilities should be given a greater weight in production decisions.

Once the contractors are selected, Government planners then request information dealing with the producer's capability to meet specific requirements. For simplification, we will use Form 1519 (see Appendix A) as an example of the way information is requested. In one section (Block 10), the planner specifies the accelerated production schedule the producer should plan to meet during surge or mobilization. For air-to-air missiles, since they are threat-oriented items the planner has been saying, "N units are required as soon as possible." It is this method of expressing requirements to which I objected in Chapter III. It is not specific enough, it is confusing to the contractor, and it is not working. Some contractors have been under the impression that once N units are delivered, the production line will go cold, when logic would dictate that some post-surge or post-war production will be needed and therefore should be planned for.[2] Moreover, in Table III–1 we saw how one contractor responded to the N unit requirement: he planned the production over 36 months. Block 10 should look something like Table IV–1 when 4,400 is assumed to be our N:

MONTHLY SCHEDULE											
M+1 2 3	4 5 6	7 8 9	10 11 12	13 14 15	16 17 18	19 20 21	22 23 24	25 26 27	28 29 30	31 32 33	34 35 36
10. REQUIRED DELIVERY SHOULD M-DAY OCCUR DURING FY 01											
200 200 200	300 300 300	400 500 500	500 500 500	300 300 300	200 200 200	300 300 300	200 200 200	200 200 200	300 300 300	200 200 200	200 200 200
11a. ALLOCATED PRODUCTION							b. SHIFT BASIS				

Requirements Schedule

TABLE IV - 1

In the next section (Block 11a), the contractor describes the production rate he agrees to carry out if the "go" signal is given. If this schedule does not meet that requested by Block 10, the contractor is supposed to list (in Block 19) the improvements in his capability necessary for him to meet the schedule, in sufficient detail to make cost-benefit analyses possible. If no schedule is specified in Block 10,

then the contractor has no way of knowing if improvements are needed, nor can Government ensure that all the contractors on the same system are working with the same sheet of music. These improvements are called "Industrial Preparedness Measures (IPMs)."

When properly completed, Blocks 14 through 17 also provide valuable information. "Minimum Sustaining Rate (MSR)" is the lowest production rate at which a plant can economically retain its production and/or maintenance capability for the item being reviewed.[3] Contractors who understood the intent of the program and conscientiously tried to carry it out have suggested IPMs that would improve their maximum capacity and production rates. This information is proprietary and Government personnel carefully safeguard contractors' interests.

Filling in the Form 1519 is voluntary on the part of industry unless a contract specifically requires it. The planned producers can be of great benefit in industrial preparedness, so we should select them carefully and encourage their allegiance to the program. Once the producers are on board, we should provide them with realistic production requirements. Industry can then provide us with Block 19 data we can use to make an informed decision on what production rate we should choose. It is an iterative process.

CRITICISM

As we go through this section we should ask ourselves, "Did this criticism spring from the policy or the way the policy was carried out?"

Contractors say it is time to stop planning and to start spending on IPMs.[4] Part of the contractors' frustration stems from the dearth of feedback on their recommended Industrial Preparedness Measures (IPMs). They go to the trouble and expense of developing them, but nothing happens. Subcontractors decline to participate in the IPP for additional reasons. First, it requires manhours for which they usually are not compensated (especially if the IPMs are not executed). Second, small firms are not familiar with the program and have little desire to be further bogged down in Government paperwork.[5]

In 1977, the General Accounting Office reported, "Contractors' capacity projections to meet wartime requirements are generally

unreliable, and little is done once the data is received by the Services to overcome forecasted production problems. The overall adequacy of industries' capability to meet mobilization requirements is, in many instances, unknown."[6]

In 1980, the Defense Science Board found:

—Products to be surged [were] not adequately defined or sufficiently limited.

—Lack of realism and commitment in [the] DD 1519 approach.

—Current IPP system does not encourage Government/industry commitments.[7]

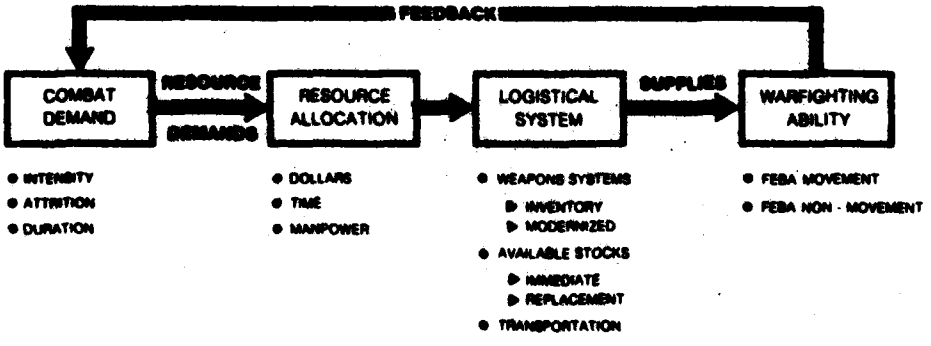
In the project manager's view, the IPMs are a competitor for funds. He is more interested in current production than in industrial preparedness. In 1977, a questionnaire was sent to project managers, among others, to develop a list of "lessons learned" for future project managers to use in preparing for their job.[8] One of the questions asked was, "What intuitive and/or management skills do you feel are needed most importantly by the PM [project manager] to make good contracting strategy decisions?" Of the responses listed, one mentioned knowledge of the funding cycle, one, procurement regulations, one, acquisition process, but none mentioned the Industrial Preparedness Program, or more generally, mobilization.

The mobilization planners on the Service staffs face a dilemma. They solicit industry for meaningful mobilization and surge data, but lack the clout to acquire the funds to finance the resulting IPMs. With all the criticism hurled at the IPP, the mobilization planners have been so busy defending the program that they cannot spread the good word about the program's benefits. Without general understanding the program and its accomplishments, neither Government nor industry will lend its full support. On a panel at a 1980 conference dealing with preparedness, a general or flag officer represented three of the four Services. When asked about the existence of a mobilization plan, the three senior officers professed ignorance. In no way do I impugn those three officers, but I illustrate a general problem. It seems that the only military people who are familiar with the IPP are either those directly involved in its implementation or graduates of the Industrial College of the Armed Forces, where it is taught as an elective course.

In answer to the question posed at the outset of this section, *the problems surfaced by these criticisms are more a fault of deficient policy execution than the policy itself.* I agree with the observation that the US Government tends to overemphasize policy formulation at the expense of policy execution.[9] There have been accomplishments through the IPP. For example, throughout the defense industry a large network is involved in detailed mobilization and surge planning. Planned producers have been identified and are prepared to deliver missiles once given the signal. Choke points have been identified. There has been conscious effort to incorporate acceleration capability into procurement decisions. For example, in 1978 the SIDEWINDER program was "broken down into seven discrete components for which there [were] dual contractors providing competitive and mobilization base procurement for each component."[10] Moreover, in-depth studies like the Hercules study on rocket motors have been commissioned.

A BETTER WAY (Continued)

One way to portray the relationship between defense material demands and logistic responses is shown in Figure IV–1. In this model, combat demands drive the problem. But note also the "feedback" line. If war-fighting ability decreases, then the feedback line will urge that demands increase.[11]

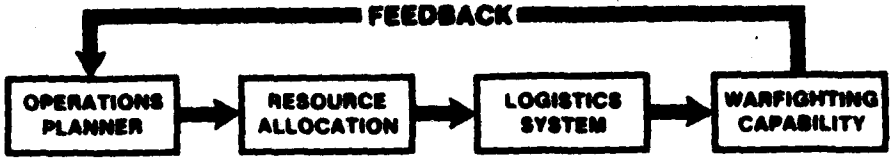


WARTIME DEMAND AND SUPPLY

FIGURE IV - 1

In peacetime, the Combat Demands box is missing. On occasion, the Defense Department may hold an exercise in which the exercise monitors feed in combat demands; but, normally this box is

absent. I believe that in peacetime this box should be filled in by the operations planners, the people who make up the requirements. The peacetime model, then, would look like Figure IV–2.



PEACETIME DEMAND AND SUPPLY

FIGURE IV - 2

Deciding on a target accelerated production rate should follow the same process. The operations planner expresses his needs, the Services allocate (if necessary) funds for a topdown study of the producer's capability, the mobilization planner passes the requirements and the study funds to the producer, and the producer states his capability. If the capability falls short of the desired production rate, the producer specifies the IPMs he needs to meet production requirements. This capability and/or IPMs are fed back to the operations planner. If necessary, he adjusts the requirements according to the risks and costs and passes them back to the producer. The operations planner may determine, for example, that requirements and capabilities are so far apart that he may suggest to the program manager a design modification increasing the weapon's probability of kill, thus reducing quantitative requirements. Once the producer's capability and IPMs meet the operations planner's needs, then the agreed requirements are once again passed to the producer via the resources allocation and logistics groups, who will fund and execute the IPMs through contracts. This new area—contracts—will be discussed in Chapter V.

SUMMARY

Although there have been some accomplishments, the industrial preparedness problems facing us today tell us that the trends are bad and more needs to be done. Industry confidence in IPP is fading. Procurement decisions are shifting away from a concern for mobilization and surge. The Government needs better data from industry on which to base decisions leading to improvements in the base.

Therefore, the solutions to these problems should deal with the way we carry out the Industrial Preparedness Program. They begin by recognizing the need for the program—Realities #1 and #2. Next, they require better understanding of the program and how it can work to our benefit—iterating requirements and IPMs. Finally, the solutions require action on the IPMs, which is the theme for Chapter V.

IV. ENDNOTES

1. US, Department of Defense, *Industrial Preparedness Planning Manual, DOD 4005.3–M* (Washington, DC: Government Printing Office, July 1972), p. viii.

2. Interview with George M. Malta, Defense Contract Administration Service Plant Representative Office, Raytheon Corporation, Burlington, MA, 20 November 1980.

3. DOD, *Industrial Preparedness Manual*, p. vii.

4. Sidney Stark, "Sparrow Surge Planning," presented at the 1979 Annual Meeting of the Industrial Preparedness Division, American Defense Preparedness Association, Alexandria, VA, 24 April 1979.

5. For a thorough list of industry comments, see US, Comptroller General, Report to the Congress, *Restructuring Needed of Defense Program for Planning with Private Industry for Mobilization Production Requirements*, GAO Report No. PSAD–77–108 (Washington, DC: United States General Accounting Office, 1977), pp. 7, 8.

6. Ibid., p. i.

7. Defense Science Board, "Task Force on Industrial Responsiveness Summary Briefing," 15 August 1980.

8. Charles Bernard Darley, "Contracting Strategy for Navy Missile Acquisitions" (Report for the Defense Systems Management College, Fort Belvoir, VA, November 1977), p. 10.

9. Jacques S. Gansler, *The Defense Industry* (Cambridge, MA: MIT Press, 1980), p. 279.

10. Darley, "Contracting Strategy," p. 6.

11. Harry F. Ennis, *Peacetime Industrial Preparedness for Wartime Ammunition Production* (Washington, DC: National Defense University Press, 1980), p. 81.

V

OTHER SOLUTIONS

With an understanding of requirements and the Industrial Preparedness Program (IPP), one is better able to discuss ways to improve industry's preparedness to meet defense requirements. These solutions address the problems raised by industry, operational planners, and outside observers; do not interfere with the first priority—building the stockpile; and, ideally, enhance peacetime productivity.

This chapter categorizes solutions as removing obstacles, providing incentives, improving contracts, and prestocking materials and components. To highlight the advantages of each category, it treats them separately. Then in the final section, it combines the best parts of each to emphasize the potential for even greater benefits.

REMOVING OBSTACLES

To prepare the path for increased industrial responsiveness the Department of Defense (DOD) should remove all obstacles. Administrative lead time should be reduced to the bare minimum. For example, letter contracts should be drawn up for accelerated production of air-to-air missiles. The specific production rate can be negotiated,

agreed on, and the contract signed. When the "go" signal is given, a simple execute instruction is delivered and industry begins production. Letter contracts should be extended vertically through the structure, from prime contractor down to the smallest vendor, for full effectiveness. Procedures must be set up for keeping the contract provisions current.

Moreover, the Department of Defense should seek legislation from the Congress giving the Secretary of Defense authority to bypass regulations that would inhibit the accelerated production of air-to-air missiles.[1] Requirements to award contracts to businesses—either prime or subcontractors—in high unemployment areas or those operated by minorities are important social and economic safeguards. But, as pointed out in Chapter IV, the *qualifications* of planned producers are of paramount importance. They must be able not only to meet peacetime production requirements, but also to accelerate or sustain production over a long period. We should not let an entire missile system (and subsequently our air superiority and war-winning capability) be vulnerable to a single producer's limited capability. Environmental and worker protection regulations are also very important but are potentially debilitating to defense if, for example, small forging plants continue to go out of business. These arguments do not suggest wholesale DOD exclusion from social and environmental regulations. Only in those cases where a clear and significant risk to national security is demonstrated should a waiver be granted. The importance of such decisions requires that they be limited in number and to the Secretary himself.

INCENTIVES

A first step in providing incentives for industry investment in prestocking material and installing new plant equipment is to remove the disincentives. Material earmarked for the production of high-priority defense items, even while in a reserve status, should be exempt from state inventory taxes. Moreover, the Department of Defense should allow the inclusion of interest expense on contracts. "Contractors are not motivated to borrow money to buy upgraded and more efficient equipment when the interest charged on that borrowed money must come out of profit."[2] The Office of the Under Secretary of Defense for Research and Engineering should collect and act on similar suggestions leading to the removal of disincentives.

Of all the incentives for capital investment, one of the most important is more rapid depreciation of equipment costs. Current tax laws allow plant equipment to be depreciated over 6–12 years. Many foreign countries allow a much higher rate. For example, Japan allows up to 193 percent depreciation for the first year. It should be no surprise that Japan also led the world in capital investment (31.3 percent of GNP) and increase in productivity (9 percent) from 1960 to 1976.[3]

An equally important incentive is to stabilize Government's commitment to procurement through multiyear contracts. Instead of the current practice of opening contracts for bids each year and changing buy quantities and contractors, the multiyear contract would spread Government's commitment to buy a certain quantity of missiles over a specified period, say 3 to 5 years. This type contract would underwrite the contractor's investment in materials and equipment by reimbursing him in the event the contract is cancelled. It allows long-range planning and smooth, continuous production rather than annual fluctuations that ripple vertically through the tiers. It allows volume buys of material and subassemblies. The desires of Congressional and budget officials to keep their options open regarding program decisions should be subordinated to the condition of the industrial base (read capital investment).

Multiyear contracts would take maximum advantage of the learning curve normally associated with missile production. Moreover, the start-up costs associated with a new contract and later capital investment would be amortized over a longer period, resulting in lower per unit costs. The Air Force Systems Command estimates routine savings from 10 to 30 percent by using multiyear contracts:

> One recent example was our awarding in March 1980 of two multi-year contracts for GAU-8 30mm ammunition used on the A-10 aircraft. This was a competitive procurement where the two qualified bidders split the total quantity in a ratio between 65 and 35 percent. The split was determined by how well they priced their offer. Being able to request prices on the entire 25.1 million rounds—3 years requirements—saved us a documented $34 million (on contracts totalling $339 million) over what single-year acquisitions of smaller quantities would have cost us.[4]

One might argue that the use of multiyear contracts will mean fewer contracts and result in a further decrease in the number of de-

fense contractors and subcontractors. That concern is probably worthy of further consideration, but at first blush it would seem that there is plenty of defense business to go around. Moreover, these larger contracts would seem to be very attractive and the competition, accordingly, very great. Because any start-up costs could be amortized for a long period, many new contractors and subcontractors, who now cannot realistically compete with those already producing, may be attracted. This competitiveness plus all the advantages mentioned above dictate that the Department of Defense (DOD) try multiyear contracts for air-to-air missiles.

The final group of incentives gather under the label of "teamwork." First, DOD needs to keep industry informed of its decisions on Industrial Preparedness Measures (IPMs). Even if the IPMs are too expensive, too vague, inappropriate, or approved but lower in priority than others, a contractor deserves an answer on his suggestions. Not to address them indicates a lack of interest on the part of Government.

Second, planned producers should receive preferential treatment for Government contracts on air-to-air missiles. Whether for new US production (including surge and/or mobilization), or foreign military sales, the contract should go to contractors who have planned with the Government and agreed to accelerate production during a crisis. They should at least be given the opportunity to bid. Such action would ensure a warm base, lend credibility to the Industrial Preparedness Program, and provide incentive for participation in the program.

Another way to promote the teamwork concept is to place more responsibility (and concomitant authority) with the project manager. The responsibility for status of a missile program, to include the mobilization and/or surge capability, should reside in that office. Being the center of activity for a program, the project manager can better coordinate the activities of the operations and mobilization planners. Funding for IPMs should be a part of a missile program. Funds for projects that go outside a single missile's area (for example, an IPP planner's TDY funds) can come from other areas (using the same example, the industrial support or mobilization shop).

Incentives, then, can result in high payoffs for relatively low expense. By listening to industry's complaints and safeguarding industry's interests, we are more likely to gain their cooperation in improv-

ing the base. Removing disincentives like inventory taxes and prohibitions against including interest costs on contracts are the first step. More rapid depreciation of capital investment and multiyear contracts could result in enough savings for Government itself to invest in prestocking and better equipment. Finally, through better teamwork Government can increase industry's confidence in defense's sincerity towards industrial preparedness.

SURGE CONTRACTS

Perhaps one of the most promising suggestions to surface in recent times is the "surge contract" or "contract surge" concept. It is an agreement that "obligates the contractor to make advance plans and take those actions necessary to ensure delivery, after notification by the Government, of a predetermined quantity or rate of items needed within a given period of time."[5] Under this concept, when Government drafts the contract it sets down the desired accelerated production schedule. When it is opened for bids, the contractors determine how much it costs to achieve the desired capability. When the contract is signed, everything is up front so there is no question as to commitment on the part of either Government or industry. The contractor then goes ahead and takes whatever measures are necessary to achieve and maintain the agreed production capability. The surge contract essentially follows the Form 1519 process except that, instead of a voluntary planning tool, it is a binding contract and funds are expended to assist the contractor. There are many other advantages to letting a surge contract:

a. It requires the prime contractor to obtain reliable capability information from his subcontractors and vendors since a contract (and money) is at stake. The prime contractor should follow Government's example and issue surge contracts to his subcontractors.

b. It shortens administrative lead time for surge and mobilization production.

c. It is a long-term commitment which encourages capital investment such as prestocking long lead-time items, purchasing additional test equipment, and installing more productive equipment.

d. The accelerated production can be initiated short of a declaration of national emergency, although funding would have to be diverted from other programs or expeditiously appropriated.

e. It would be an explicit definition of Government requirements, something that in the eyes of industry has been missing.

f. It can be used to fill the gap when there is no current production in progress. For example, during retooling between the AIM-54A and the AIM-54C models of the PHOENIX, production will be halted for a while. A surge contract could ensure that some capability to produce is maintained during the changeover.

There is one possible disadvantage when the surge contract is separate from a current production contract. Because of the likelihood that accelerated production may not be executed, the contract may not attract many bidders. For that reason the last section of this chapter recommends that the surge contract be tied to a current production contract where possible.

The Air Force Logistics Command (AFLC) has been a pioneer in the development of the surge contract concept. In 1980, they budgeted $845,000 to fully test the idea. A contract is to be signed in which each of the companies agrees to maintain the capability to accelerate its production to a certain rate. As much as a year may be required for the companies to acquire the capability. At a later date, AFLC will signal the companies to begin producing at the accelerated schedule. This test should provide much information as to the value of the surge contract concept.

PRESTOCKING

Earlier, this chapter discussed ways to motivate industry toward investing in prestocking. This method of improving industrial preparedness is so important that it is worthy of consideration for direct Government investment.

In "prestocking," I include not only critical material, but also components requiring a long time to process. An example of critical material involves rocket motors, which are pacing items for all three air-to-air missile systems. A chemical called "Butarez" is an ingredient common to rocket motors in all three missiles. The normal lead

time for acquiring Butarez is about 70 weeks; therefore, it would seem prudent to stockpile the chemical so that rocket motors can be produced more rapidly.

An example of a component is another long lead-time item on the SIDEWINDER rocket motor—the aft hanger assembly—which is used to attach the missile to the aircraft. To obtain this part, 52 weeks are required. It may be beneficial to increase the peacetime production rate of this component and stockpile it for use during accelerated production of the overall missile.

For maximum benefit, prestocking should take place all the way down the production line, not just at the prime contractor level. Wherever chokepoints occur, items could be prestocked on the exit side. That way, when accelerated production is signaled, the entire line can surge. Of course, such a tactic would require expert planning and cooperation on the part of the contractors.

Besides speeding up production, several other advantages are inherent in prestocking:

a. Buying large quantities of material and components results in lower per unit costs.

b. Buying outyear components now will save on inflation. The cost of 47 major weapon programs increased by $47.6 billion the last 3 months of 1980.[6]

c. There is reasonable certainty that prestocked items eventually will be used to build a missile. Even if there is no surge or mobilization, peacetime production will use the item. In contrast, a piece of equipment, bought to give a plant added capacity during accelerated production, may never see action. The stock can be rotated so that the first items into the inventory are the first ones out.

d. Prestocking decreases competition for limited resources during an emergency. Reason holds that, in a full mobilization situation, other defense items and other sectors of the economy will place large, high-priority demands on critical materials like titanium and processed items like forgings. Prestocking during peacetime lessens the demand.

e. Compared to investment in equipment, prestocking would provide less incentive for industry to understate its capability.

In 1977, the General Accounting Office (GAO) recommended against prestocking for two reasons.[7] In the first instance, they were concerned that some long lead-time items would be overlooked, resulting in the production of the entire missile being held up even though many other items were prestocked. The concern is a valid one but should not serve to rule out prestocking altogether. As mentioned earlier, thorough planning would be required if one wished to prestock throughout an entire production line. Sophisticated management tools, such as critical path networks, are available to today's industry and should be of assistance. Moreover, some items, like chemicals for rocket motors, are conspicuous. Identifying them and compensating for them is a relatively simple task.

The second GAO objection dealt with the modernization question. "The planning would have to be continuously updated to assure that prestocked items have not become obsolete and that other critical components have not become long lead-time components." This concern is probably more likely to be a major factor for a new weapon than for one with which the defense industry has had considerable experience. Moreover, with routine planning, existing component stockpiles can be used up as replacements are delivered and it is no more difficult or expensive to update a component than an entire missile. If this second objection were overriding, then we should cease stockpiling missiles. Finally, the decisionmaker needs to ask himself, "Is this modification really worth the extra expense and the loss in mobilization production capability caused by retooling and lack of prestocked components?" Again, the GAO has identified genuine concerns for project managers to keep in mind; but these arguments should not rule out prestocking altogether. Defense should consider the marginal utility that prestocking provides in the way of reduced lead time for each case and make the decision based on its merits.

TYING IT TOGETHER

In discussing several suggestions for improving industrial preparedness, this chapter has thus far looked at them as separate elements. Combinations of these suggestions would be even more ef-

fective. The ideal solution would be to tie together a multiyear contract for peacetime procurement with a surge contract that required maintaining a capability to accelerate production to a specified rate. As peacetime production progresses through the term of the contract, the mobilization and/or surge production requirements would normally decrease. To ensure fair competition, the contract specifications for both peacetime production and accelerated rate capability should be the same for all bidders. Finally, contracts should be granted to at least two sources for each of the major components to allow greater capability to expand (through multiple shifts), greater competition, security, and reliability.

This eclectic approach to contracting should net several advantages. Since it specifies an agreed accelerated production rate it reduces administrative lead time. Any material that is prestocked under this type contract would be Government property and therefore exempt from state inventory taxes. Being a multiyear contract, it underwrites capital investment and attracts bidders, especially at the subcontractor level. The savings achieved through multiyear procurement could help offset the extra cost incurred as a result of including the requirement to be able to accelerate production. Finally, the inclusion of a surge contract would require a prime contractor to be knowledgeable in the capabilities of subcontractors and vendors.

Implementing such a complex approach to defense production will not be without problems, but it is needed and the potential advantages dictate that first steps begin right away. I propose that the Air Force Logistics Command (AFLC), because of its pioneering in surge contracting, take the lead and indoctrinate all the Services in the advantages and techniques involved in implementing combined peacetime and accelerated production contracts. The results of the AFLC experiments should be monitored carefully, but implementation of similar contracts elsewhere should not wait for them. As a pilot program, the Navy should let combination contracts for the SPARROW missile on a trial basis for the next 5-year period. Once the contracts are executed, the Form 1519 then becomes a tool for monitoring the progress of both the peacetime production and the accelerated capability aspects.

The use of combination contracts coupled with improvements, such as allowing the Secretary of Defense to waive obstructing legislation, allowing faster depreciation and interest costs on capital in-

vestments, and employing greater teamwork within the Department of Defense and between that agency and industry, will accrue great benefits and offset many of the problems raised throughout this monograph. The next chapter reviews the highlights of this approach.

V. ENDNOTES

1. R. James Woolsey, as quoted by American Defense Preparedness Association, *Proceedings September 1980*, pp. 212–214.

2. General Alton D. Slay, USAF, "The Air Force Systems Command Statement on Defense Industrial Base Issues," presented to the Defense Industrial Base Panel of the House Armed Services Committee, 96th Cong., 2d sess., 13 November 1980, p. V–8.

3. Ibid., p. V–24. The Japanese growth figures are for the period 1960–76.

4. Ibid., pp. VII–27, 31.

5. United States Air Force Logistics Command, "The Contract Surge Concept," March 1980, p. 1.

6. *Washington Post*, 21 February 1981, p. A3.

7. US, Comptroller General, Report to the Congress, *Restructuring Needed of Defense Program for Planning With Private Industry for Mobilization Production Requirements*, GAO Report No. PSAD–77–108 (Washington, DC; United States General Accounting Office, 1977), p. 15.

VI

TO START WALKING

This final chapter incorporates the ideas, the arguments, and the suggestions for improving the capability to produce air-to-air missiles. It first reviews the current situation regarding requirements and capabilities. It next outlines the process in being—the Industrial Preparedness Program. Then it summarizes a prescription for improvement. Finally, as a checklist, the entire thesis is compared to Mr. Dantzig's idea of beginning at the end of the problem.

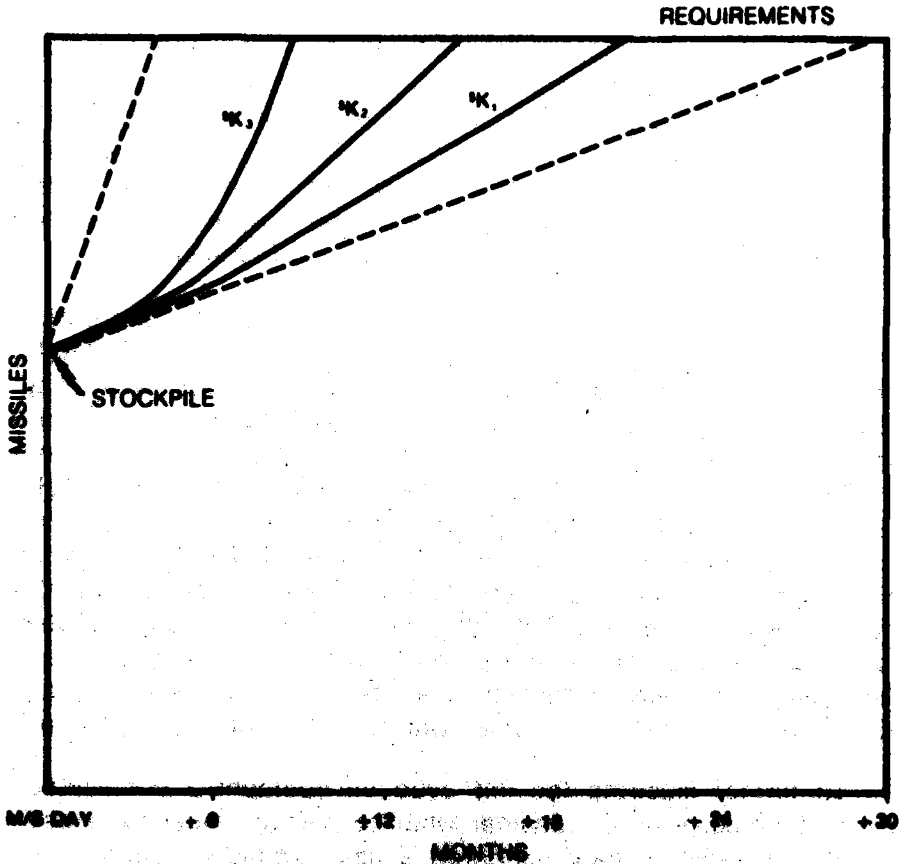
To spur movement toward improving the industrial base, this monograph requested the reader to accept certain realities. Reality #1 is that the stockpile of air-to-air missiles is short of objectives at the time of this writing and is likely to remain short for at least the next 5-year cycle. Next to full storage bins, the best thing to have is an industrial base capable of rapid buildup. However, Reality #2 is that, unless Government acts, the industrial base will not be able to meet the desired level of production during an emergency and the situation is getting worse. Subcontractors are leaving the defense industry. Another reality is that money spent after M-Day will not buy time for at least the first 2 years. Lead times for certain materials and components are long, and increasing.

In view of these realities, this monograph made certain arguments for investing time and money in industrial preparedness. First,

in the days of constrained budgets it has not been possible to meet stockpile requirements by only investing in current production. The best alternative under these conditions is to invest in both the stockpile and the industrial base. Second, the Government should not reduce its stockpile; therefore, it should be prepared to replace any missiles used during a contingency. Third, the Government should not allow day-to-day decisions to reduce the industrial capability to accelerate production. Mobilization and surge potential should be carefully considered during peacetime production decisionmaking. Finally, the marginal utility of investment in the industrial base should be compared to that of investments in the stockpile. A seemingly judicious near-term programming decision may not look so good when held up to its impact on capability in the long run.

To improve industrial preparedness, the first step is to specify requirements. The threat-oriented methodology for calculating requirements is preferred for air-to-air missiles. However, expressing stockpile requirements as a list of the total number of weapons desired is not compatible with existing communication links between defense and industry. To a company that has been producing missile components at the rate of 100 per month, for example, it is confusing and unrealistic to suddenly ask for 3,000 units. A preferred way of expressing surge and mobilization requirements would be to specify a feasible delivery schedule that includes both the desired accelerated production rate and the post-surge or post-war needs. Navy and Air Force operations and mobilization planners for air-to-air missiles have informally agreed to this approach. It will be tested in Fiscal Year 1981 and, it is hoped, eventually institutionalized—a definite first step.

Defining and communicating requirements can be accomplished through the Industrial Preparedness Program. In developing requirements there are three major considerations: making it easier for the prime contractors to plan realistically with their subcontractors, allowing operational planners and project managers to make better informed decisions, and balancing the risks and costs that go into the final choice of mobilization and surge production rates. The actual process for developing requirements must be an iterative and a cooperative one. Rough risk and cost information can be obtained by operations planners and industry communicating through the Form 1519. A chart like the one at Figure VI-1 can be developed for an overall missile system as well as individual components. The dialogue need not be restricted to production rates; information could



MISSILE DELIVERIES

Figure VI-1

also be exchanged about such topics as manpower problems during mobilization, foreign sources for material and production, possible scenarios, transportation, modernization, and competition with civilian requirements. Thus, by understanding and fully utilizing a program that already exists, even for the limited task of developing requirements, both Government and Industry can realize great benefits.

One could hardly perceive that possibility from the criticism the Industrial Preparedness Program (IPP) has received, however. [illegible] been spent on industrial preparedness measures.[1] Moreover, a

dearth of understanding exists about the IPP. Understanding begins with knowledge. In 1981, the Naval Air Systems Command was developing a slide and tape presentation on IPP. It should receive wide distribution throughout the Department of Defense (especially the military) and industry. The IPP should be taught during the command-and-staff-level courses for all the Services. By understanding more about the IPP, critics will come to agree that we need to emphasize properly implementing it instead of replacing it.

Defining and communicating requirements are only one part of implementing the IPP. Industrial preparedness measures need to be identified, financed, executed, and monitored. The best way to accomplish that is through combination peacetime and accelerated production contracts. This type of contract would provide the incentive for contractors to provide accurate and thorough planning data, for the result of their effort will be a long-term commitment. The multiyear procurement aspect would provide incentives for investment in materials and equipment. The result will be not only a better knowledge of capabilities, but better capabilities, not only for mobilization, but also for peacetime productivity. It was gratifying to see the strong endorsement the House Armed Services' Defense Industrial Base Panel gave to multiyear contracts—a strong second step.[2]

To further illustrate the improved environment a combination contract would provide, consider what contractors must have been thinking in 1980 as they pondered a new production contract for changing from the AIM-7F to the AIM-7M missile. Should they base their bids on two shifts a day or one a day? One shift a day would be better for surge because it would allow rapid expansion to three shifts. But two shifts would be cheaper since less equipment would be required to maintain the same peacetime production rate. To win a production-only contract, the bidders lean towards the cheaper route. With a combination contract, the bidders would be concerned with both the costs of peacetime production and attaining the capability to maintain the surge and/or mobilization rates.

Besides the combination contract, Government could consider other actions. Giving the Secretary of Defense authority to bypass constraints on surge under mobilization decisions and reducing administrative lead time and costing, but can increase industrial responsiveness. Allowing limited changes on contracts that would depreciation of equipment costs would also result in economic capital investment leading to greater peacetime productivity and capability

to expand during emergencies. Prestocking, while not increasing a plant's capacity, would have the same end effect—delivering more items over a period of time after M-Day. Moreover, it would result in lower per unit costs and help battle inflation.

With the 1950s came the label "military-industrial complex" followed by safeguards against conflicts of interest. I offer no proof, but suggest that this philosophy has aggravated decreasing cooperation between individuals in Government and industry. And this division has gone too far—our capability is suffering because of it. There can be a better appreciation of each other's concerns, capabilities, and interests without sacrificing the ideals of fair competition and free enterprise. Put another way, there can be competition at fair prices without discouraging industry's capital investment. All the things mentioned—combining contracts, removing bureaucratic obstacles, providing incentives for capital investment, and prestocking—are ways of dealing with industrial feedback on how to best meet defense needs. They do not compromise ideals and do not necessarily cost more money. It can be argued that in the long run, due to improved efficiencies and competition, the country will come out ahead financially while accruing greater industrial preparedness.

RECOMMENDATIONS

Throughout this monograph are problems along with specified or implied recommendations leading toward their solution. The recommendations are consolidated here according to the positions to which they are directed.

The Congress and Office of the Secretary of Defense

1. Legislate against disincentives for capital investment for the production of high-priority defense items. Examples of such disincentives are state inventory taxes, prohibitions on including interest expenses on defense contracts, and low rates of depreciation of capital investment.

2. [illegible]

pational Safety and Health Administration and Environmental Protection Agency regulations are examples of those that could be near-term constraints on the capability for emergency production.

3. Designate the Under Secretary of Defense for Research and Engineering as the ombudsman who will act on suggestions, criticism, questions, and reports of success involving the Industrial Preparedness Program.

The Military Services

1. Institutionalize and support training leading toward a better understanding and appreciation of the IPP. The slide presentation being developed by Naval Air Systems Command is a start. Similar information should be presented to decisionmakers and middle managers involved in weapons programs. The IPP should be included in military command-and-staff-level courses.

2. Seek and respond to feedback from defense industries. Their perspective on regulations, contracting procedures, item specifications, and capital investment can lead to significant improvements in production capability.

3. Take action on the measurements of industrial base capabilities that are now available. Investment in industrial preparedness measures will do more than any other single effort to gain the interest and confidence of industry in preparedness.

4. Adopt the use of combination peacetime and accelerated production contracts, and train personnel in their intent and use.

5. Initiate a combination, multiyear contract for SPARROW, this year. I recommend SPARROW because it has the greatest gap between current and requirements, is almost between MODIFICATION and PRODUCTION, and has been in production for many years.

6. Assign to project managers greater responsibility and authority for [illegible]

Mobilization Planners, Program Managers, Operations Planners, and Industry

1. Talk to each other. All should provide input to major program decisions. Changing planned producers, specifying mobilization requirements, and implementing major weapon modification are particularly important topics for consultation.

2. Expand your knowledge and understanding of the IPP. In a wartime environment industry must fill in where the stockpile left off.

3. Strive for dual sources for critical components of air-to-air missiles.

4. Maintain high standards for planned producers. As long as they are qualified, support them with clear requirements and opportunities to produce.

5. Give considerable weight to surge and mobilization needs when letting peacetime contracts. Examples of such needs are multiple domestic sources, single work shifts, and capital investment incentives.

6. Employ and continue to develop tools for increasing industrial preparedness such as multiyear contracts, surge contracts, prestocking, rapid depreciation, and allowance for interest costs for equipment investment.

7. Use combination peacetime and accelerated production contracts.

PREPARING FOR SURGE

Chapter II introduced the concept of asking ourselves, "What would we buy if we had an increase of 50 percent in the budget? How would we tie everything together? What investments should we [illegible] to do when we [illegible]? All of [illegible] we would [illegible] this question [illegible]

Because of their high priority, air-to-air missiles are likely to be high on the Government's shopping list in the event of a large budget

increase. To get the missiles, DOD, through industry, needs material, manufacturing equipment, labor, and energy.

To tie it all together, one must establish requirements, identify contractors, convey the requirements and disbursements to the contractors, build the missiles, transport them, store them, and maintain them until they are fired by trained pilots. Security will be a continuing concern. Priority over other demands on resources will be necessary.

Some of the problems this approach raises have not been discussed in this monograph. Transportation provokes a whole new series of problems, such as getting material from subcontractors to prime contractors, from the factory to the depot, from the depot to the theater, and finally to the user. Storage facilities and pilot training are other areas that properly fall into other discussions.

This study did address the remaining portion dealing with the scope of matters between the "go" signal and completed missiles. The peacetime preparedness discussion included developing and communicating clear and feasible requirements to planned producers and ways to shorten lead times and expand the quantity of items that industry can produce. Ideally, the reader will improve on this list of suggestions and will relay his ideas on how to better help prepare industry for accelerated production of air-to-air missiles. Not all these suggestions can be implemented at once. We must walk before we run, but let's start walking.

VI. ENDNOTES

1. Interview with Sidney M. Stark, Raytheon Company, Bedford, MA, 19 November 1980.

2. U.S. Congress, House, Defense Industrial Base Panel, *The Ailing Defense Industrial Base: Unready for Crisis, Report of the Defense Industrial Base Panel of the Committee on Armed Services*, 96th Cong., 2d sess., 31 December 1980. See also U.S. Congress, House, Armed Services Procurement Policy Act of 1981, 97th Cong., 1st sess., 6 January 1981, H.R. 745.

DOD INDUSTRIAL PREPAREDNESS PROGRAM PRODUCTION PLANNING SCHEDULE	Form Approved OMB No. 22-R001

NOTE: Use of the data entered on this form will be limited to duly accredited officials of the Department of Defense who are subject to penalties for unlawful disclosure. The great value given to data relating to your facility under the Espionage Act and other statutes will enable accountability within the Government to those responsible for procurement, production preparedness planning, and defense of the United States.

Procuring Activity/Customer Plant Data	Industrial Source (Operating Plant) Data
1. NAME AND ADDRESS (Include ZIP Code)	2. NAME AND ADDRESS (Include ZIP Code) PLANT INDEX NUMBER
1a. REPRESENTATIVE AND TELEPHONE NUMBER	2a. REPRESENTATIVE AND TELEPHONE NUMBER
1b. CUSTOMER PLANT ADPO CODE NO. _____ OFFICE AND ADDRESS 1c. REPRESENTATIVE AND TELEPHONE NUMBER	2b. ADPO CODE NO. _____ OFFICE AND ADDRESS 2c. REPRESENTATIVE AND TELEPHONE NUMBER
1d. THIS SCHEDULE COVERS: ☐ PRIME CONTRACTOR PLANNING ☐ SUBCONTRACTOR PLANNING (Tier)	2d. DUNS

ACCEPTANCE BY INDUSTRIAL MANAGEMENT AND BY GOVERNMENT

The signatures below attest that the information contained herein is true and correct to the judgment of the signatories as the date of signature. Further the signatures indicate (1) an awareness of the Government's dependence upon these data on a basis for appropriate and timely industrial responses to insure the adequacy of the US industrial base, (2) recognition of the Government's intention to subject production planning schedules to contract by negotiation on a collective basis as may be required to minimize national shortages during a Short Limited War, and (3) recognition that it is also the Government's intention, throughout this work planned production as may be committed to prime contracts by negotiation, to assure that planned subcontract support will be similarly committed to subcontractors. Notwithstanding the foregoing basis for acceptance, the signatures herein in no way bind the named firm(s) nor the Government in any contractual relationship, nor is acceptance to be construed as an agreement by industry to maintain production capability on balanced basis. The signature of industry does not obligate the named firm to accept a military contract if and as offered, nor is the Government obligated to subject production planning schedules to negotiation, to contract with the named firm if procurement of the items specified herein is required, or to accept planned subcontract support in appearance if the planned production is canceled or prime agreement. It is recognized, however, that the named firm(s) and the Government may enter into a binding contract(s) under applicable laws and regulations as may be in effect at the time.

3. Procuring Activity or Customer Plant	4. Operating Plant U.S.	5. [illegible]	[illegible]
SIGNATURE AND DATE	SIGNATURE AND DATE	SIGNATURE AND DATE	
[illegible]	[illegible]	[illegible]	
[illegible]	[illegible]		

[illegible]

Appendix A

a. ITEM DESCRIPTION												c. REFERENCE NUMBER
												d. UNIT OF MEASURE
MONTHLY SCHEDULES												
M+1 2 3	4 5 6	7 8 9	10 11 12	13 14 15	16 17 18	19 20 21	22 23 24	25 26 27	28 29 30	31 32 33	34 35 36	
10. REQUIRED DELIVERY SHOULD M-DAY OCCUR DURING FY												
11a. ALLOCATED PRODUCTION								b. SHIFT BASE				
12. REQUIRED DELIVERY SHOULD M-DAY OCCUR DURING FY												
12a. ALLOCATED PRODUCTION								b. SHIFT BASE				
13a. [illegible]											b. [illegible]	
c. [illegible]												
d. [illegible]												
14. [illegible]												
[illegible]												

[illegible] JUL 72 [illegible] PAGE 21 DPC 0102-013-1770

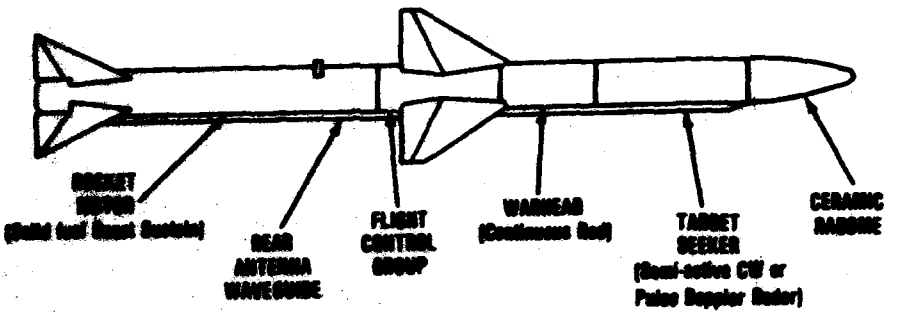
Appendix A

18. ITEMS/SOURCES - SUBCONTRACTOR PLANNING EXTENDED (Privileged Information)

19. DESCRIPTION OF PREPAREDNESS MEASURE

20. REMARKS

Appendix A



AIM-7F/M SPARROW MISSILE
(Typical)

AIM-7F/M SPARROW

US will begin production of AIM-7M model in FY 81.

Supersonic

Radar target detection capability

Medium Range

Length—144 inches

Diameter—8 inches

Weight—510 pounds

Used on F-4, F-14, F-15, F-18, A-18 aircraft

Joint Navy/Air Force project with Navy as Executive Service

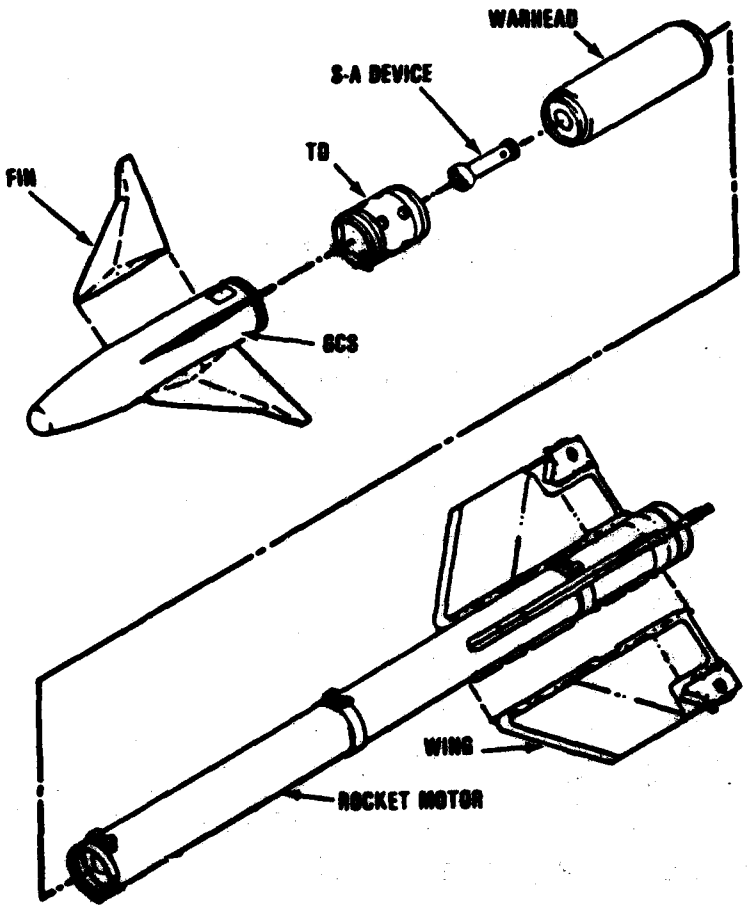
All up around assembly by Navy and Air Force weapons stations

Production is divided into four major components:

- Guidance and Control Section
- Safety and Arming Device
- Warhead
- Rocket Motor

Unit Flyaway Cost FY-79: $129,470

Appendix B



AIM-9L/M SIDEWINDER GUIDED MISSILE, EXPLODED VIEW
(Typical)

AIM-9L/M SIDEWINDER

US will begin production of AIM-9M model in FY 81

Supersonic

Infrared target detection capability

Short Range

Length—113 inches

Diameter—5 inches

Weight—189 pounds

Used on F-4, F-14, F-15, F-16, F-18, A-6, A-7, A-18, AV-8

Joint Navy/Air Force project with Navy as Executive Service

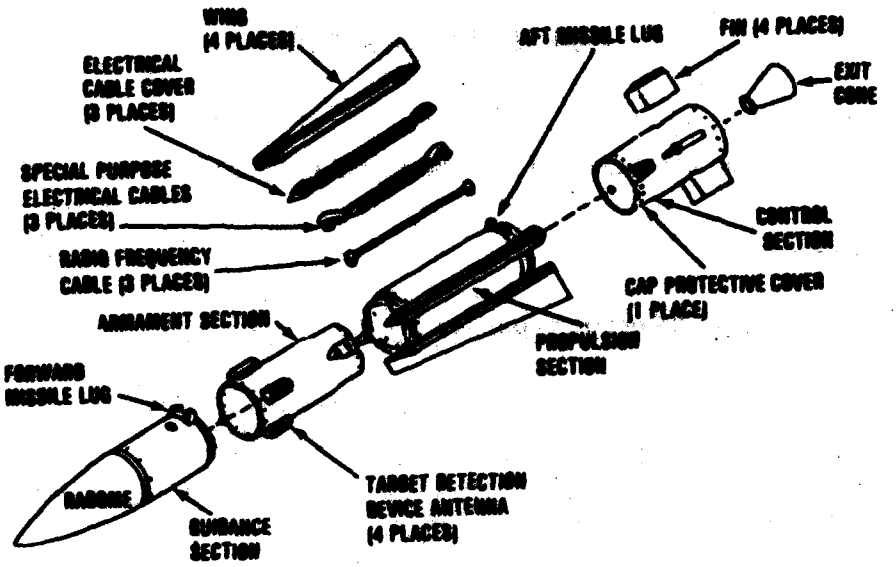
All up around assembly by Navy and Air Force weapons stations

Production is divided into seven major componer s:

- Guidance and Control Section
- Active Optical Target Detector
- Safety and Arming Device
- Warhead
- Rocket Motor
- Wings
- Fins

Unit Flyaway Cost FY-79: $57,000

Appendix G



EXPLODED VIEW OF THE AIM-54A PHOENIX MISSILE

AIM-54A PHOENIX

US will begin production of AIM-54 C model in FY 81

Supersonic

System capable of simultaneously destroying multiple targets

Long Range

Length—156 inches

Diameter—15 inches

Weight—989 pounds

Used on F-14 aircraft

Navy project

All up around assembly by prime contractor

Production is divided into three major components:

- Guidance and Control Section
- Warhead
- Rocket Motor

Unit Flyaway Cost FY-79: $413,000

Appendix D

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